HOMEWORK 10-PART C

Remark: Dear class, I understand that you may have some issue going on to miss classes. But please try to attend class as possible as you can. The classes we are running right now become pretty new and hard. The main point is that I add more stuff (especially pictures) into my old notes when lecturing. I am afraid you may get lost if you just look at the old notes without attending class.

1.For the given planar system

$$\begin{aligned} x' &= v \\ v' &= -2x - v \end{aligned}$$

(1) Draw the direction field for the system on phase plane.
(2) Sketch the solution curve passing through the initial point $(x_0, v_0) = (1, 0)$ by the direction field in (1).
(3) Solve the initial value problem (the system above and initial value condition is $(x_0, v_0) = (1, 0)$).
(4) Draw the solution curve in (3) on the phase plane(you can use computer to help you draw the curve), and compare with the curve in (2).

2. (1) Solve the linear system $y' = \begin{pmatrix} 1 & 4 \\ 2 & -1 \end{pmatrix} y$ with initial value condition $y(0) = \begin{pmatrix} -3 \\ 0 \end{pmatrix}$.
(2) Draw the solution curve of (1), and denote the direction arrow of $y(t)$ as time t increasing. (As we have done in class, first draw the two particular exponential solutions, then draw our solutions.)

3. (1) Solve the linear system $y' = \begin{pmatrix} 1 & 4 \\ 2 & -1 \end{pmatrix} y$ with initial value condition $y(0) = \begin{pmatrix} -1 \\ -2 \end{pmatrix}$.
(2) Draw the solution curve of (1), and denote the direction arrow of $y(t)$ as time t increasing. (As we have done in class, first draw the two particular exponential solutions, then draw our solutions.)